REMARKS

Claims 1-11 and 38-50 are currently pending. Claims 12-37 have been withdrawn from consideration. Claim 6 has been amended to recite "peroxide" anion which is used to generate and release ozone gas. Support for the amendment can be found throughout the application, including page 18, lines 11-12.

Applicant acknowledges that during a telephone conference on June 6, 2003, a provisional election was made with traverse to prosecute the invention of Group I, claims 1-11, and 38-50. While an election was also made as to species, the election recited in the office action dated September 16, 2003 is incorrect. There it is said that the applicant elected the following species: energy activated catalyst = metal oxide, solid containing anions = hypochlorite salt, electromagnetic energy = light, and gas generated = chlorine. As a result of the election, claims 11 and 50 were also withdrawn from examination in the office action.

However, the applicant respectfully submits that the actual species election made via telephone on June 6, 2003 was as follows: energy activated catalyst = metal oxide, solid containing anions = chlorite salt, electromagnetic energy = light, and gas generated = chlorine dioxide. Since claims 11 and 50 include these species, claims 11 and 50 are not withdrawn from consideration and should be examined as part of Group I. As such the patentability of claims 11 and 50 is addressed throughout this response.

A. The Claimed Invention

The pending independent claims 1 and 8 of the present invention are composition claims directed to electromagnetic energy-controlled generation and release of a gas. The pending independent claims 39 and 46 are composition claims directed to the light activated photocatalytic-controlled generation and release of a gas. All claims involve activation of some form of electromagnetic energy catalyst (e.g., photocatalyst) to oxidize or react an anion to generate and release a gas.

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As defined in the application, electromagnetic energy consists of an energy source that provides a photon having energy in excess of the band gap of the energy-activated catalyst (page 18, lines 32 - page 19, line 2 of the specification). Preferred electromagnetic energy sources are disclosed to be sunlight, fluorescent light, and ultraviolet light. It is believed that when exposed to electromagnetic energy, the catalyst absorbs a photon having energy in excess of the band gap. An electron is promoted from the valence band to the conduction surface of the energy-activated catalyst where they can react. An anion is oxidized by the activated catalyst surface when an electron is transferred from the anion to the valence band hole, forming the gas (page 11, lines 1-10).

B. Rejection under 35 U.S.C. §102 over Hancock U.S. Patent No. 5,772,897

Reconsideration is respectfully requested of the rejection of claims 1-11 and 38-49 as being anticipated by Hancock U.S. Patent No. 5,772,897 or Yoshida U.S. Patent No. 6,306,352. It is said that Hancock teaches using a porous support impregnated with metal oxides, such as copper and zinc oxides, which is placed in an aqueous medium with sodium hypochlorite to oxidize a pollutant to carbon dioxide. Although it is admitted in the office action that Hancock "does not directly disclose the use of electromagnetic energy, such as light, to activate the metal oxide(s)," this was "deemed to be moot since applicant's invention is drawn to a composition not to a method of activating the composition."

Hancock teaches a catalytic oxidation process in an aqueous medium comprising adding an oxidizing agent to the aqueous medium and passing the mixture through a fixed bed of a particulate catalyst. The oxidizing agent is decomposed by the catalyst with the evolution of oxygen (col. 2, lines 18-29). Hancock does not describe activation of a catalyst by electromagnetic energy and oxidation or reaction of anions to generate and release a gas as required in the present claims. Therefore, claims 1-11 and 38-50 are not anticipated by Hancock. More specifically, Hancock describes

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decomposition of organic matter to form carbon dioxide and water (col. 3 line 20 - 32). For example, in Hancock's Example 4, benzoic acid and sodium hypochlorite react to form carbon dioxide, water, and sodium chloride. Carbon dioxide is generated by the decomposition of organic matter, not by the oxidation or reaction of anions to generate a gas. Such decomposition reactions were addressed by applicants in the background of the subject application at p. 1, lines 20-29, wherein it is stated that "[c]arbon dioxide is generated by the decomposition of organic matter, not by the oxidation of anions." If the anions described by Hancock were energy activated so that they oxidized or reacted to form a gas, as in the present claims, then the peroxide would form ozone, not oxygen, and the hypochlorite would form chlorine, not carbon dioxide.

Moreover, Hancock teaches away from the claimed composition which generates and releases a gas. Hancock avoids gas evolution from his aqueous medium since it wastes oxidizing agent needed for the decomposition reaction (col. 1, lines 56 -59; col 4, lines 1-5). Hancock also does not describe a composition including both the catalyst and the anions. Rather, Hancock maintains the catalyst separate from the aqueous medium containing the anions, and warns that leaching of the catalyst from the support into the aqueous effluent is undesirable (col. 4, lines 6-11). Not only does Hancock fail to describe anions capable of generating a gas or a gas-releasing composition, but he also fails to teach a composition comprising both the catalyst and the solid or solid-containing suspension containing the anions.

Furthermore, it is improper to characterize the "capable of" statements in the claims as moot, since those functional limitations define the scope of the invention. "A functional limitation must be evaluated and considered, just like any other limitation of the claim, for what it fairly conveys to a person of ordinary skill in the pertinent art in the context in which it is used." MPEP 2173.05(g). To a person of ordinary skill in the art, the claimed catalysts in the present invention are limited to those "capable of being activated by electromagnetic energy" or "capable of being activated by light." According to MPEP 2173.05(g) and *In re Barr*, 444 F.2d 588, 595 (CCPA 1971), a functional

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limitation is "perfectly acceptable" as long as it sets "definite boundaries on the patent protection sought." The applicant submits that the functional limitations set forth in the present invention set definite boundaries on the protection sought in requiring energy activation for the generation and release of the gas. If this rejection is maintained, it is incumbent on the Examiner to provide some rationale as to why these limitations are not considered to set definite boundaries on the patent protection sought.

If the Office is asserting that the composition described by Hancock is the same as the applicant's composition, except for function not explicitly disclosed by Hancock (i.e., the function of the applicant's invention is inherent in the prior art composition), the Office must provide a rationale or evidence showing the function is necessarily present and would be so recognized by one skilled in the art. It is incumbent on the Examiner to provide "a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art." MPEP § 2112; *Ex parte Levy*, 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Inter. 1990) (emphasis in original). One skilled in the art would not have expected the anions of Hancock to generate and release a gas upon energy activation. Rather, one skilled in the art would have expected the decomposition reaction as described by Hancock. If inherency is alleged as a basis for this rejection, the Examiner has not articulated a proper basis for this rejection which is contrary to the law and Office policy.

As noted above, claims 11 and 50 are not withdrawn and are pending. These claims are not anticipated by Hancock for the reasons presented above. Furthermore, these claims require the presence of either chlorite, nitrite or peroxide anions and generation and release of either chlorine dioxide, nitrogen oxide or ozone. Although Hancock describes peroxide, he does not disclose generation and release of chlorine dioxide, nitrogen oxide or ozone. Therefore, claims 11 and 50 are not anticipated by Hancock. Applicants submit that these claims are allowable even if the Examiner continues to deem other portions of the claims moot.

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C. Rejection under 35 U.S.C. §102 over Yoshida U.S. Patent No. 6,306,352

It is said that Yoshida teaches oxygen-generating materials containing carbon dioxide absorbers and that the present claims are anticipated over a composition comprising sodium carbonate hydrogen peroxide adduct, manganese dioxide and activated alumina as described in Example 24. Again, the description of the claimed catalysts as being "capable of being activated by electromagnetic energy" or "capable of being activated by light" and of the claimed anions as being "capable of being oxidized or reacted to generate at least one gas" has been deemed moot.

Yoshida '352 teaches an oxygen-generating material which is prepared by packaging solid peroxide and peroxide decomposition catalyst with a moisture-permeable material. The oxygen generating materials of Yoshida generate oxygen by coming in contact with water or moisture (col. 8, lines 6 - col. 9, line 6). Like Hancock, Yoshida describes moisture activated decomposition, not energy activated oxidation or reaction of anions to generate and release a gas. Rather, Yoshida's solid peroxide decomposes in the presence of water to generate oxygen. Yoshida also includes a decomposition catalyst to catalyze the decomposition of hydrogen peroxide into water and oxygen gas. If the decomposition described by Yoshida were energy activated, as in applicant's composition, then Yoshida's composition would produce ozone, not oxygen.

As stated in section C above, it is improper to characterize the "capable of" statements in the claims as moot, since those functional limitations define the scope of the invention. If this rejection is maintained, it is incumbent on the Examiner to provide some rationale as to why these limitations are not considered to set definite boundaries on the patent protection sought. Also if inherency is alleged as a basis for this rejection, the Examiner has not articulated a proper basis for this rejection which is contrary to the law and Office policy.

Yoshida '352 or Hancock do not teach, suggest, or provide any motivation to generate a gas from an anion through electromagnetic energy-activated catalysis as

claimed in the present invention. No disclosure in Yoshida or Hancock would have motivated the skilled person to make the energy-activated compositions of the claimed invention.

Claims 11 and 50 are pending and are not anticipated by Yoshida '352 for the reasons presented above. Furthermore, these claims require the presence of either chlorite, nitrite or peroxide anions and generation and release of either chlorine dioxide, nitrogen oxide or ozone. Although Yoshida describes peroxide, he does not disclose generation and release of chlorine dioxide, nitrogen oxide or ozone. Therefore, claims 11 and 50 are not anticipated by Yoshida '352. Applicants submit that these claims are allowable even if the Examiner continues to deem other portions of the claims moot.

D. Rejection under 35 U.S.C. §102 over Zhang U.S. Patent No. 5,783,105 or Yoshida U.S. Patent No. 5,898,126

Reconsideration is respectfully requested of the rejection of claims 1-5, 7-11, 38-42 and 44-49 as being anticipated by Zhang U.S. Patent No. 5,783,105 or Yoshida U.S. Patent No. 5,898,126. It is said that Zhang teaches oxygen generating compositions that comprise a transition metal oxide catalyst, a metal fuel, an oxygen source material, etc. Again, the description of the claimed catalysts as being "capable of being activated by electromagnetic energy" or "capable of being activated by light" and of the claimed anions as being "capable of being oxidized or reacted to generate at least one gas" has been deemed moot.

Zhang teaches a breathable oxygen gas generation composition comprising substantially carbon-free tin as fuel and rheological modifier, a transition metal oxide as catalyst and an oxygen source consisting of alkali metal chlorates or perchlorates. The oxidation of the gas-producing anions is thermally activated through the ignition and combustion of tin (col. 5, line 65 through col. 6, line 8). An ignition pellet is ignited by firing a percussion primer which then initiates tin combustion that thermally catalyzes the oxidation of the oxygen source thereby releasing oxygen gas. Such use of metal

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oxides as thermally activated catalysts for the oxidation of inorganic anions provide uncontrolled, irreversible, rapid and voluminous oxygen gas release for use in aircraft oxygen generators. Zhang does not describe the use of the transition metal catalysts as electromagnetic- or photo-catalysts to initiate controlled generation and release of a gas. Zhang does not teach, suggest, or provide any motivation to generate a gas from an anion through electromagnetic energy-activated catalysis as claimed in the present invention. No disclosure in Zhang would have motivated the skilled person to make the energy-activated compositions of the claimed invention.

Yoshida '162 is relied upon by the Office as teaching air bag generating compositions that comprise a nitrogen containing organic compound, an oxygen generating compound, and a catalyst. Again, the description of the claimed catalysts as being "capable of being activated by electromagnetic energy" or "capable of being activated by light" and of the claimed anions as being "capable of being oxidized or reacted to generate at least one gas" has been deemed moot.

Yoshida '162 teaches an air bag gas-generating composition comprising an azodicarbonamide, an oxo halogen acid salt and a nitrate. The gas generation mechanism involves the thermal activated oxidation of an organic compound containing nitrogen by an oxo halogen salt or nitrate to provide gas release for use in automotive air bags (col. 3, lines 6-27). An ignitor is electrically detonated to thermally oxidize the organic compound thereby releasing nitrogen gas. Addition of metal oxide is taught as a combustion control catalyst to adjust burning velocity (col. 5, lines 30-45). Although Yoshida's composition may include a metal oxide, it serves as a combustion control catalyst and does not catalyze oxidation or reaction of anions to generate and release a gas, as in the claimed invention (col. 5, line 30 - col. 6, line 36). The function of the metal oxide in Yoshida's composition is to control the burning velocity within acceptable limits, not to catalyze the oxidation reaction.

As stated in section C above, it is improper to characterize the "capable of" statements in the claims as moot, since those functional limitations define the scope of

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the invention. If this rejection is maintained, it is incumbent on the Examiner to provide some rationale as to why these limitations are not considered to set definite boundaries on the patent protection sought. Also if inherency is alleged as a basis for this rejection, the Examiner has not articulated a proper basis for this rejection which is contrary to the law and Office policy.

Claims 11 and 50 are pending and are not anticipated by Zhang or Yoshida '162 for the reasons presented above. Furthermore, these claims require the presence of either chlorite, nitrite or peroxide anions and generation and release of either chlorine dioxide, nitrogen oxide or ozone. Neither Zhang nor Yoshida '162 disclose chlorite, nitrite or peroxide anions and generation and release of chlorine dioxide, nitrogen oxide or ozone. Therefore, claims 11 and 50 are not anticipated by Zhang or Yoshida '162. Applicants submit that these claims are allowable even if the Examiner continues to deem other portions of the claims moot.

E. Rejection under 35 U.S.C. §102 over Cawlfield et al U.S. Patent No. 5,411,643

Reconsideration is respectfully requested of the rejection of claims 1-5, 7-11, 38-42 and 44-49 as being anticipated by Cawlfield et al U.S. Patent No. 5,411,643. It is said that Cawlfield teaches an integrated process of using chloric acid to separate zinc oxide and manganese oxide and that these claims are anticipated by the chorine generating aqueous compositions comprising chloric acid, zinc oxide and manganese oxide.

Cawlfield teaches a process for producing manganese dioxide and zinc metal by using chloric acid to separate zinc oxide and manganese oxide. In Cawlfield, manganese oxide is reacted with a molar excess of chloric acid to form chlorine gas, a solid phase containing manganese dioxide, a liquid phase containing chloric acid and water. The chloric acid dissociates into hydrogen ions and chlorate ions in aqueous solution (col. 4, lines 39-52). If the chlorine gas had resulted from energy activation of anions, as in applicants composition, hypochlorite anions would have been present, not

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chlorate anions as in Cawlfield. Nowhere does Cawlfield teach, suggest, or provide any motivation to generate a gas from an anion through electromagnetic energy-activated catalysis as claimed in the present invention. While Cawlfield may include a metal oxide, the purpose of Cawlfield's process is to separate the zinc oxide and the manganese oxide to produce manganese dioxide and elemental zinc. The metal oxide in Cawlfield does not serve to catalyze oxidation or reaction of anions to generate and release a gas as in the claimed invention. The function of the metal oxide in Cawlfield is to serve as the basis for the production of an elemental metal, not to catalyze the oxidation reaction.

As stated in section C above, it is improper to characterize the "capable of" statements in the claims as moot, since those functional limitations define the scope of the invention. If this rejection is maintained, it is incumbent on the Examiner to provide some rationale as to why these limitations are not considered to set definite boundaries on the patent protection sought. Also if inherency is alleged as a basis for this rejection, the Examiner has not articulated a proper basis for this rejection which is contrary to the law and Office policy.

Claims 11 and 50 are pending and are not anticipated by Cawlfield for the reasons presented above. Furthermore, these claims require the presence of either chlorite, nitrite or peroxide anions and generation and release of either chlorine dioxide, nitrogen oxide or ozone. Cawlfield does not disclose chlorite, nitrite or peroxide anions and generation and release of chlorine dioxide, nitrogen oxide or ozone. Therefore, claims 11 and 50 are not anticipated by Cawlfield. Applicants submit that these claims are allowable even if the Examiner continues to deem other portions of the claims moot.

F. Rejection under 35 U.S.C. §103 over Yoshida U.S. Patent No. 5,896,126

Reconsideration is respectfully requested of the rejection of claims 6 and 43 as being unpatentable under 35 U.S.C. §103 over Yoshida U.S. Patent No. 5,898,126. It is said that it would have been obvious to one having ordinary skill in the art to use the

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broad disclosure of Yoshida as motivation to use one of applicant's claimed anion species. Yoshida '126 is described in detail above.

Yoshida '126 does not teach, suggest, or provide any motivation to generate a gas from an anion through electromagnetic energy-activated catalysis as claimed in the present invention. Yoshida's description of thermal activated oxidation of an organic compound containing nitrogen by an oxo halogen salt or nitrate to provide uncontrolled, irreversible, rapid and voluminous nitrogen gas release for use in automotive air bags would not have motivated one skilled in the art to make the claimed invention, and would not have provided any guidance as to how to do so.

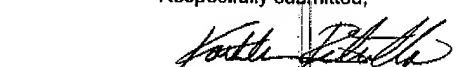
The use of chlorite or hypochlorite would not have resulted in oxidation or reaction of such anions to generate and release chlorine dioxide or chlorine gas as suggested by the Office. Therefore, even if one was motivated to substitute one of applicant's anions for the oxo halogen acid salt of Yoshida '126, the substitution does not result in the claimed invention.

In view of the foregoing, favorable reconsideration of pending claims 1-11 and 38-50 is respectfully requested.

After the examiner has had an opportunity to review this amendment, applicant requests a telephone interview with the examiner before another Office action is mailed.

It is believed that no fees are due in connection with this Amendment. If, however, the Commissioner determines a fee is due, he is hereby authorized to charge said government fees to Deposit Account No. 19-1345.

Respectfully submitted,



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